

## CLAIMS

What is claimed is:

1. A water based drilling fluid capable of forming a membrane through in-situ polymerization comprising:
  - an aqueous continuous phase;
    - a first reactant, wherein the first reactant is a soluble monomer, oligomer, or polymer with exposed ketone, aldehyde or aldol groups or with groups which can be shifted to ketone or aldehyde functionality; and,
    - a second reactant which is a primary amine, diamine, or polyamine which by condensation reaction forms semi-soluble or precipitated filming product with the first reactant.
2. The drilling fluid of claim 1, wherein the first reactant is selected from the group consisting of: an aldehyde, a ketone, a synthetic polymer, branched starch, unbranched starch, dextrin, methylglucoside, substituted methylglucoside, corn syrup, malto-dextrin, molasses, sugar, cellulose, reducing sugars, polymerized reducing sugars and mixtures and combinations thereof.
3. The drilling fluid of claim 1 wherein the second reactant is an amino acid or polyamino acid.
4. The drilling fluid of claim 1 wherein the second reactant is selected from the group consisting of hexamethylene diamine (HMDA), ethoxylated alkyl ether amine, propoxylated alkyl ether amine, polyoxy propylene diamine, and combinations thereof.
5. The drilling fluid of claim 1 wherein the aqueous fluid contains a salt.
6. The drilling fluid of claim 5 wherein the salt is selected from sodium chloride, potassium chloride, calcium chloride, sodium sulfate, potassium sulfate,

1 calcium sulfate, sodium nitrate, potassium nitrate, calcium nitrate and  
2 combinations thereof.

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4 7. A method of making a water based drilling fluid comprising:  
5 mixing together the following:  
6 an aqueous fluid;

7 a first reactant which is a soluble monomer, oligomer, or polymer with  
8 exposed ketone, aldehyde, or aldol functional groups or with groups  
9 which can be shifted to ketone or aldehyde functionality; and,

10 a second reactant which is a primary amine, diamine, or polyamine which  
11 by condensation reaction forms a semi-soluble or precipitated filming  
12 product with the first reactant.

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14 8. A method of drilling a well in a formation with shale comprising:  
15 drilling using a drilling fluid comprising:  
16 an aqueous fluid;

17 a first reactant which is a soluble monomer, oligomer, or polymer with  
18 exposed ketone, aldehyde, or aldol groups or with groups which can be  
19 shifted to ketone or aldehyde functionality; and,

20 a second reactant which is a primary amine, diamine, or polyamine which  
21 by condensation reaction forms a semi-soluble or precipitated filming  
22 product with the first reactant; to create an osmotic membrane on the  
23 shale formation.

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25 9. A method of increasing shale formation stability with a water based drilling  
26 fluid comprising:  
27 delivering to the shale formation a drilling fluid comprising:  
28 an aqueous fluid;

29 a first reactant which is a soluble monomer, oligomer, or polymer with  
30 exposed ketone, aldehyde, or aldol groups or with groups which can be  
31 shifted to ketone or aldehyde functionality; and,

1           a second reactant which is a primary amine, diamine, or polyamine which  
2           by condensation reaction forms a semi-soluble or precipitated filming  
3           product with the first reactant.

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5       10. A method of generating an osmotic membrane over a shale formation  
6       comprising:

7           delivering to the shale formation a drilling fluid comprising:  
8       an aqueous fluid;

9           a first reactant which is a soluble monomer, oligomer, or polymer with  
10          exposed ketone, aldehyde, or aldol groups or with groups which can be  
11          shifted to ketone or aldehyde functionality; and,

12          a second reactant which is a primary amine, diamine, or polyamine which  
13          by condensation reaction forms a semi-soluble or precipitated filming  
14          product with the first reactant.

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